

Five new conservation-listed species of *Goodenia* (Goodeniaceae) from southern Western Australia

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Abstract

Sage, L.W. & Shepherd, K.A. Five new conservation-listed species of *Goodenia* (Goodeniaceae) from southern Western Australia. *Nuytsia* 17: 331–346 (2007). The following new species of *Goodenia* are described: *G. corralina* L.W.Sage & K.A.Sheph., *G. granitica* L.W.Sage & K.A.Sheph., *G. jaurdiensis* L.W.Sage & K.A.Sheph., *G. salina* L.W.Sage & K.A.Sheph. and *G. turleyae* L.W.Sage & K.A.Sheph. All of these species are apparently geographically restricted and have conservation priority. Distribution maps and images of the holotypes are included and amendments to the “Flora of Australia” *Goodenia* key are given to accommodate these new species.

Introduction

The recognition of five new species here brings the total number of *Goodenia* R.Br. listed on the Western Australian Census to 143 (Western Australian Herbarium 1998–). This includes 16 putative new taxa that are currently known by informal phrase names and part of ongoing taxonomic investigation by one of us (LWS). Forty-six Western Australian taxa within *Goodenia* (32%) have a Priority status under Department of Environment and Conservation (DEC) Conservation Codes for Western Australian Flora (Sage & Pigott 2003; Atkins 2006). *Goodenia integerrima* Carolin is the only species listed as Declared Rare Flora (DRF) (Atkins 2006), although *G. arthrotricha* Benth. has recently been recommended to be upgraded from Priority Two to DRF after a recent survey and detailed conservation study (Sage & Hoskins, unpublished data). Many of these Priority taxa are likely to require listing as DRF, however, this process has been hampered by a lack of survey data (Sage & Pigott 2003). In contrast, some current Priority taxa may be more common than is currently known because of a similar lack of field survey or as a result of plants being incorrectly attributed to more common species by field collectors (Sage & Pigott 2003). While many *Goodenia* in Western Australia face threats common to other conservation-listed taxa, they are also highly susceptible to hydrological changes and over-grazing as many species favour habitats associated with water sources (Sage & Pigott 2003).

The five species described here all have conservation priority as they are poorly known and apparently geographically restricted (Figure 1). They occur in a diverse range of habitats including creeklines and herb beds associated with granite outcrops (*Goodenia granitica* L.W.Sage & K.A.Sheph., *G. corralina* L.W.Sage & K.A.Sheph.), salt lake edges (*G. salina* L.W.Sage & K.A.Sheph., *G. turleyae* L.W.Sage & K.A.Sheph.) and low lying plains below the slopes of banded ironstone gravel and

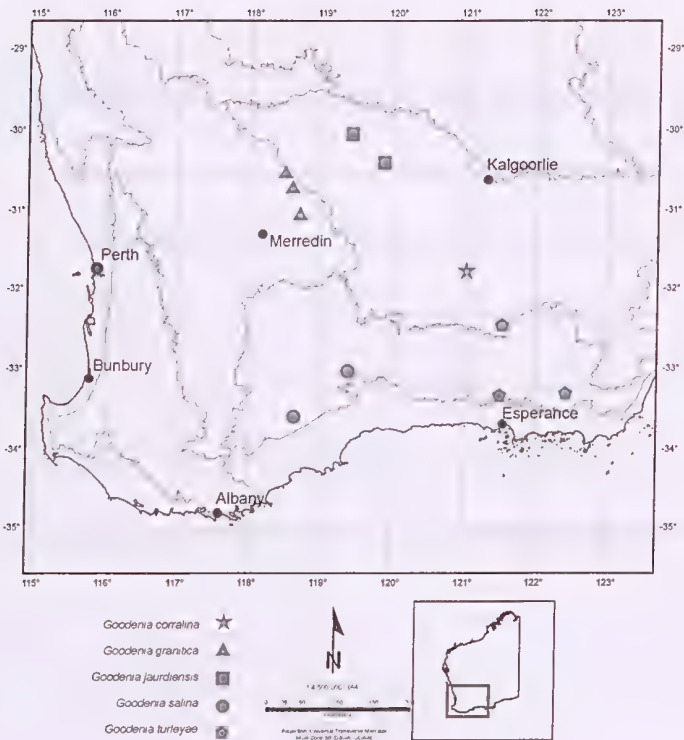


Figure 1. Distribution of *Goodenia corralina*, *G. granitica*, *G. jaurdiensis*, *G. salina* and *G. turleyae* in southern Western Australia.

quartz (*G. jaurdiensis* L.W.Sage & K.A.Sheph.). These species have been recently discovered during botanical surveys and identified by LWS through ongoing curation of the collection at the Western Australian Herbarium (PERTH).

Methods

This paper is based on the examination of collections at PERTH and field observations. Characters were scored from pressed specimens and rehydrated flowers sampled from herbarium material. The taxonomic affinities and placement within infrgeneric groups for these new species are made following Carolin (1992), though recent molecular phylogenetic work by the authors will further clarify the infrgeneric groupings recognised within *Goodenia* (Shepherd, Sage & Krauss, unpublished data).

Precise localities are withheld due to conservation concerns. Distribution categories are based on Version 5.1 of the Interim Biogeographic Regionalisation for Australia (IBRA) as modified on FloraBase (Thackway & Cresswell 1995; Western Australian Herbarium 1998–). Distribution maps are based on IBRA Version 6.1 (Department of the Environment and Water Resources 2007) and were created using ArcGIS 9.0 (ESRI) with coordinates taken from collections lodged at PERTH.

Taxonomy

Goodenia corralina L.W.Sage & K.A.Sheph., *sp. nov.*

Goodenia lamprospermae F.Muell. affinis sed sepaliis longioribus, inflorescentia plus composita et habitu humili patenti differt.

Typus: north-west of Norseman, Western Australia [precise locality withheld for conservation purposes], 20 May 2004, M. Hislop & F. Hort MH3203 (*holo*: PERTH 07002394).

Goodenia sp. Norseman (M. Hislop & F. Hort MH3203), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au> [accessed 30 March 2007].

Low spreading perennial herb 10–70 cm high, glabrous with occasional hairs on leaves. *Leaves* basal in a rosette-like arrangement, leaves entire or dentate to lyrate, linear to narrowly oblanceolate gradually narrowing basally, lobes oblong to linear; lamina (including petiole) 34–120 mm long, 1.2–11 mm wide, lobes 0.4–5.1 mm long, 0.3–1.8 mm wide, glabrous or with very few scattered simple hairs 0.1–0.13 mm long on the midrib and margin; apex rounded to acute. *Inflorescence* a 12–80-flowered raceme, 40–700 mm long, glabrous; peduncles 40–114 mm long; pedicels 9–11 mm long, with an abscission line *c.* 1.8 mm below the ovary; bracts leaf-like, at the base of the pedicel, linear, entire, 5–22 mm long, 0.3–0.6 mm wide, apex rounded; bracteoles leaf-like, linear, entire, glabrous, 2.8–3.6 mm long, 0.18–0.2 mm wide, the apex rounded. *Sepals* linear, adnate to *c.* $\frac{3}{4}$ of the ovary, 5.0–6.5 mm long, 0.3–0.7 mm wide, glabrous, apex rounded. *Corolla* yellow, to 14 mm long, not articulate; tube 6.0–7.5 mm long, pouch absent; lamina with scattered glandular hairs and sometimes short simple hairs 0.05–0.08 mm long towards the base outside, fine white hairs 0.1–0.2 mm long at the top of the throat below the abaxial lobes inside, auricle margin glabrous. *Abaxial corolla lobes* 5.6–6.3 mm long, 1.1–1.4 mm wide, fused for a further 3.2–3.5 mm beyond the junction with the adaxial lobes, distinct from wings, apex acute; wings 4.2–4.8 mm long, 0.6–1.4 mm wide, rounded, with entire margins. *Adaxial corolla lobes* 9.6–11 mm long, 1.1–1.2 mm wide; auricle indistinct; wings unequal, 2.7–3.3 mm long, 0.9–1 mm wide opposite the auricle, 2.6–3.8 mm long, 1.2–1.5 mm wide above the auricle, with entire margins. *Stamen* filaments linear to narrowly oblong, 1.8–2.5 mm long; anthers elliptic, 0.9–1.1 mm long. *Ovary* 2.8–3.7 mm long, with scattered hairs 0.05 mm long outside, septum incomplete and *c.* $\frac{1}{2}$ length of locules, glabrous inside, ovules 20 to numerous. *Style* 5–5.2 mm long, with scattered purple or white hairs 0.6–0.8 mm long along the length; indusium 0.9–1.2 mm long, 1.1–1.2 mm wide, glabrous or with scattered hairs 0.2–0.6 mm long at the base, white or purple bristles 0.2–0.25 mm long on upper and lower lips. *Fruit* narrowly ellipsoid, 6.2–6.8 mm long. *Seeds* ovate, flat, red-brown, sometimes shiny 0.6–0.7 mm long, 0.4–0.75 mm wide, surface smooth; wing translucent to cream, narrow *c.* 0.05–0.1 mm wide, overlapping the seed body. (Figures 2, 3D)

Selected specimens examined. Known only from the holotype.

Distribution and habitat. This species is currently known from a single collection in the Coolgardie (COO) region of the Eremaean Botanical Province (Figure 1). It was collected near the edge of a large granite outcrop on brown loam, associated with low open woodland over sparse shrubs of *Acacia lasiocalyx*, *A. dempsteri*, *Grevillea havilandii* and herbs.

Phenology. Flowering in May, however, this is likely to be highly dependant upon rainfall.

Conservation status. DEC Conservation Codes for Western Australian Flora: Priority Two. This species is currently known from only one locality within a reserve and is potentially under threat from recreational activities and mining.



Figure 2. Holotype of *Goodenia corralina* (PERTH 07002394), scale = 3cm.

Etymology. The epithet *corralina* is derived from an anagram of R. Carolin, in honour of Dr Roger Carolin (1929–) eminent botanist and Goodeniaceae expert.

Notes. *Goodenia corralina* appears closely related to *Goodenia lamprosperma* F.Muell. on the basis of the presence of bracteoles, a yellow corolla, glabrous leaves (with occasional non-glandular hairs) and similar bracts and bracteoles. *Goodenia corralina* can be distinguished from *G. lamprosperma* by its longer (5–6.5 mm rather than 0.5–2 mm long), linear, rather than lanceolate to narrowly oblong sepals, a more divided compound inflorescence, longer fruit (6.2–6.8 mm rather than 3–4 mm long) and a distribution over 800 km south of *G. lamprosperma*.

Mostly basal leaves, the presence of bracteoles, and a yellow corolla tentatively place this species within *Goodenia* subg. *Goodenia* sect. *Porphyranthus* G. Don.

Goodenia granitica L.W. Sage & K.A. Sheph., *sp. nov.*

Goodeniae pinnatifidae Schldl. affinis sed pilis glandulosis viscidis et ovulis paucioribus differt.

Typus: Chiddarcooping Hill, Western Australia [precise locality withheld for conservation purposes], 9 October 2001, L.W. Sage 2417 (*holo:* PERTH 07464320; *iso:* AD, BRI, CANB, DNA, HO, K, MEL, NY, PERTH 07464320).

Goodenia sp. Chiddarcooping (S.D. Hopper 7055), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au> [accessed 30 March 2007].

Annual herb 5–35 cm high, with glandular hairs and scattered simple white hairs. *Leaves* basal in a rosette-like arrangement, spatulate gradually narrowing basally, almost entire to lyrate with linear to oblong lobes; lamina (including petiole) 6–115 mm long, 1.8–16 mm wide, lobes 6–13 mm long, 0.5–3 mm wide, with glandular hairs and scattered simple white hairs 0.8 mm long; apex rounded to acute. *Inflorescence* a 3–24-flowered raceme, 42–432 mm long with glandular hairs and very scattered simple hairs 0.4–0.8 mm long; peduncles 30–130 mm long; pedicels 9–45 mm long; bracts leaf-like, at base of the pedicel, linear to narrowly ovate, 14–51 mm long, 1–6 mm wide, with scattered glabrous hairs and simple white hairs, apex rounded to acute; bracteoles absent. *Sepals* green, narrowly ovate, almost free or adnate to *c.* ¼ of the ovary, 3–4.2 mm long, 0.7–0.9 mm wide, medium dense glandular hairs and scattered white simple hairs 0.5–0.7 mm long outside, scattered glandular and simple white hairs 0.1–0.3 mm long inside, apex acute. *Corolla* yellow, 13–16 mm long, not articulate; tube 2.5–5.5 mm long, pouch 0.9–1 mm long; lamina with dense glandular hairs and scattered simple hairs outside, dense or scattered simple hairs at the top of the throat to below the abaxial lobes inside, and a dense fringe of hairs 0.15–0.2 mm long on the outer margin of the auricle. *Abaxial corolla lobes* 2–3 mm long, 1–1.9 mm wide, fused for a further 3.6–5.4 mm beyond the junction with the adaxial lobes, distinct from wings, apex acute; wings 2.5–4 mm long, 1–1.4 mm wide, rounded, with entire margins. *Adaxial corolla lobes* 1.7–6 mm long, 0.7–2.3 mm wide, fused for a further 3.5–5 mm; auricle rounded, 2.5–3.2 mm long, 0.8–1.4 mm wide; wings unequal, 2.5–2.8 mm long, 1.3–1.5 mm wide opposite the auricle, 1.5–2.5 mm long, 1.1–1.2 mm wide above the auricle, with entire margins. *Stamen* filaments linear, 2.5–4.1 mm long; anthers elliptic, 1.2–2.1 mm long. *Ovary* 1.2–1.6 mm long, glabrous outside, base rounded, septum reduced or inconspicuous, scattered hairs 0.15–0.2 mm long inside near the base or on septum, ovules 7–10. *Style* 2.5–5.2 mm long, with medium dense white hairs 0.3–0.4 mm long; indusium 1.5–2.5 mm long, 2.4–3 mm wide, with dense glandular hairs and scattered simple hairs at the base, conspicuous white bristles 0.3–0.6 mm long on upper and lower lips. *Fruit* globose, to 3 mm long, with medium dense glandular hairs and scattered simple hairs outside and fine white hairs on the inner margin. *Seeds* flat, shiny black, 1.6–2.1 mm long, 1.3–1.6 mm wide excluding wing, surface smooth; wing translucent to cream, 0.2 mm wide, overlapping the seed body. (Figures 3C, 4)



Figure 3. A – fruits and seeds of *Goodenia salina* (PERTH 07462697), scale = 5mm; B – seeds of *G. salina* (PERTH 07462697), scale = 2 mm; C – seeds of *G. granitica* (PERTH 02886871), scale = 2mm; D – seeds of *G. corralina* (PERTH 07002394), scale = 1 mm.

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld] 2 Nov. 1988, S.D. Hopper 7055 (PERTH 04571053); 24 Feb. 1993, K.F. Kenneally 11355 (PERTH 02886871); 3 Nov. 2006, A. Crawford & N. Sheehy ADC 1224 (PERTH 07460406); 3 Nov. 2006, A. Crawford & N. Sheehy ADC 1225 (PERTH 07460414); 29 Nov. 2006, A. Crawford & N. Sheehy ADC 1257 (PERTH 07460422).

Distribution and habitat. Currently known from only three populations near granite outcrops in the north-eastern Avon Wheatbelt (AW) region of the South-West Botanical Province of Western Australia (Figure 1). This species grows at the base of granite outcrops in herb beds or in damp creeklines running off or through the rocks.

Phenology. Flowers from November to February but this is most likely dependant on adequate rainfall.

Conservation status. Recently listed as Priority Two under DEC Conservation Codes for Western Australian Flora, as this species is known from only two localities. These populations are potentially under threat from agricultural activities, salinity and weed invasion. A survey of nearby granite outcrops is likely to locate further populations.

Etymology. From the Latin *graniticus* as this species is found on or near granite outcrops.

Notes. *Goodenia granitica* appears related to *G. glandulosa* K.Krause. Both species lack bracteoles and have unequal adaxial corolla lobe wings, a comparable glandular hair morphology and a viscid exudate. *Goodenia granitica* can be distinguished from *G. glandulosa* by having longer sepals (3–4.2 mm



Western Australian Herbarium
PERTH 07464320

Goodenia granitica L.W. Sage
& K.A. Sheph. HOLOTYPE
DETERMINATED L.W. Sage 24/5/2007
Western Australian Herbarium (PERTH)

WESTERN AUSTRALIAN HERBARIUM, PERTH
Flora of Western Australia

Goodenia sp. *Chidlarcooping* (S.D. Hopper 7055)
Goodeniaceae
More or less prostrate annual herb. To ca 15 cm high x to ca 40 cm wide. Flowers golden yellow with darker stripes on lobes and brown or orange auricles. Leaves viscid.
Dark brown sandy clay over granite. Water course. Flat narrow valley floor in between granite outcrops (and creekline). Moist.
Acacia Dense Heath A. With *Allocasuarina* sp., *Metaleuca* sp., *Acacia* spp., *Muehlenbeckia adpressa*, *Hibbertia rupicola*, *Anagallis arvensis*, *Podolepis ? lessonii*. Dead plants (area) present. Fire history: <1 year. Fire type: wild.
Frequency: abundant in patches in flat surrounding creek with herb beds on granite nearby. Evidence of rabbits.

Coll. L.W. Sage 2417 Date: 09/10/2001
Dups. to
PERTH 07464320

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Figure 4. Holotype of *Goodenia granitica* (PERTH 07464320), scale = 3cm.

rather than 2–3 mm long) that are a different shape (narrowly ovate rather than ovate elliptic) and a longer corolla (13–16 mm rather than 8–11 mm long).

Due to the absence of bracteoles, a yellow corolla and a prominent seed wing *Goodenia granitica* is best placed within *Goodenia* sect. *Goodenia* subsect. *Ebracteolatae* K.Krause.

Goodenia jaurdiensis L.W.Sage & K.A.Sheph., *sp. nov.*

Goodeniae mimuloidi S.Moore affinis sed corollis minoribus, pilis plerumque adpressis et ovario base contracta differt.

Typus: Jaurdi Station, Western Australia [precise locality withheld for conservation purposes], 5 October 1999, L.W. Sage 1628 (*holo:* PERTH 05806100; *iso:* CANB, K).

Goodenia sp. Jaurdi (L.W.Sage 1628), Western Australian Herbarium, in FloraBase, <http://florabase.dec.wa.gov.au> [accessed 30 March 2007].

Annual, acaulescent, open herb to 7–15 cm high, with simple adpressed and antrorse hairs. *Leaves* basal in a rosette-like arrangement, first leaves entire, obovate to oblanceolate gradually narrowing basally, remaining leaves pinnatisect to pinnatifid with linear to ovate lobes in the upper two thirds; lamina (including petiole) 9–40 mm long, 2–10 mm wide, lobes 0.3–3.2 mm long, 0.4–0.8 mm wide, glabrous or with scattered simple, adpressed and antrorse hairs; apex mostly acute; base with tufts of fine hairs. *Inflorescence* a 2–4-flowered raceme, 25–78 mm long with scattered simple adpressed hairs and antrorse hairs 0.2–0.7 mm long; peduncles 25–42 mm long; pedicels 12–45 mm long; bracts leaf-like, at base of the pedicel, entire, linear to narrowly ovate or pinnatisect, 6–13 mm long, 1.5–6.0 mm wide, lobes linear, 1.1–1.7 mm long, 0.3–0.4 mm wide, with simple hairs 0.2–0.3 mm long, adpressed and antrorse on both surfaces, apex rounded to acute; bracteoles absent. *Sepals* very narrowly lanceolate to linear, 3–4 mm long, adnate to c. $\frac{3}{4}$ of the ovary, simple adpressed or antrorse hairs 0.1–0.2 mm long outside, glabrous or with very few scattered hairs inside, apex acute. *Corolla* yellow to orange, 10–14 mm long, not articulate; tube 1.5–2.2 mm long, pouch obscure not exceeding ovary; lamina with simple adpressed hairs 0.1–0.3 mm long outside, retrorse simple hairs deep inside throat, scattered long simple hairs on margins of corolla wings, and with a line of simple hairs 0.2–0.4 mm long on the outer margin of the auricle. *Abaxial corolla lobes* 3–4 mm long, 1.2–1.6 mm wide, fused for 5.3–5.4 mm beyond the junction with the adaxial lobes, distinct from the wings, apex acute; wings 2.8–5.4 mm long, 1.2–2 mm wide, with entire margins. *Adaxial corolla lobes* 5.6–7.2 mm long, 1.0–1.4 mm wide, fused for a further 2–2.2 mm; auricle cup-like, 2.5–3.1 mm long, 1.2–1.5 mm wide; wings unequal, 3–4.4 mm long, 0.7–1.8 mm wide opposite auricle, 2.4–3.4 mm long, 0.5–0.7 mm wide above auricle, with entire margins. *Stamen* filaments linear, 2.3–2.9 mm long; anthers narrowly oblong to linear, 1.2–1.5 mm long. *Ovary* 2.2–2.5 mm long, glabrous or with scattered minute glandular hairs outside, tapering basally, septum incomplete and $\frac{1}{2}$ – $\frac{2}{3}$ length of locules, glabrous inside, ovules 10–14. *Style* 2.7–3.3 mm long, with scattered short, simple hairs 0.2–0.3 mm long; indusium 2–2.5 mm long, 2.5–2.7 mm wide, obovoid and sometimes notched, with simple hairs 0.5–0.7 mm long below, scattered simple hairs 0.1–0.2 mm long above and prominent, more or less equal bristles 0.3–0.4 mm long on lips. *Fruit* and *seeds* not seen. (Figure 5)

Selected specimens examined. WESTERNAUSTRALIA: [localities withheld] 24 Sep. 1995, N. Gibson & M. Lyons 2861 (PERTH 05384990); 18 Sep. 1981, K.R. Newbey 8945 (PERTH 05362970); 19 Sep. 1981, K.R. Newbey 8945 (PERTH 02647974).



Figure 5. Holotype of *Goodenia jaurdiensis* PERTH 05806100), scale = 3cm.

Distribution and habitat. This species is currently only known from three populations c. 50 km apart on the Jaurdi Station in the Coolgardie (COO) region of the Eremaean Botanical Province (Figure 1). It is found on low-lying plains and lower slopes in red clayey loam with laterite and banded ironstone gravel or quartz pebbles in *Eucalyptus* low forests or open low woodlands of *Eucalyptus sheathiana*, *E. longicornis*, *E. ravidia*, *E. celastroides*, *Santalum acuminatum*, *Eremophila* spp., *Plantago drummondii*, *Atriplex* spp. and *Schoenia cassiniana*.

Phenology. Flowers from September to October, though flowering would be dependant upon rainfall. Fruits not seen.

Conservation status. Recently listed as Priority Two under DEC Conservation Codes for Western Australian Flora, as this species is known only from three localities less than 50 km apart.

Etymology. Named for the restricted distribution of the species on or in the vicinity of Jaurdi Station, in the eastern goldfields of Western Australia.

Notes. *Goodenia jaurdiensis* is likely to be related to *G. mimuloides* S. Moore. Both species lack bracteoles and have a decumbent habit and annual life history strategy, unequal adaxial corolla lobe wings, simple hairs rather than glandular and a broad indusium. *Goodenia jaurdiensis* can be distinguished from *G. mimuloides* by having a tapering rather than rounded ovary base, simple hairs that are adpressed rather than erect, less ovules (10–14 rather than 16–25), a generally smaller corolla (10–14 mm rather than 16–25 mm long) and narrower abaxial corolla lobe wings (1.2–2 mm rather than 2–3.5 mm wide). *Goodenia jaurdiensis* keys out to Couplet 12 of Group 8 in the *Goodenia* key in “Flora of Australia” (Carolin 1992) and is therefore comparable to *G. elongata* Labill. though distinguished by having less ovules (10–14 rather than 25–35), shorter pedicels (≥ 12 mm rather than ≤ 11 mm long) and a Western Australian rather than south-east Australian distribution.

The absence of bracteoles and a yellow corolla suggest that *Goodenia jaurdiensis* is best placed within *Goodenia* section *Goodenia* subsect. *Ebracteolatae*.

Goodenia salina L.W.Sage & K.A.Sheph., *sp. nov.*

Goodeniae pinnatifidae Schldl. affinis sed corollis minoribus, pedicellis brevioribus, ovulis paucioribus et seminibus minoribus differt.

Typus: Lake King, Western Australia [precise locality withheld for conservation purposes], 15 September 1993, M. Gustafsson & K. Bremer 132 (*holo:* PERTH 04048083; *iso:* UPS).

Goodenia sp. Lake King (M. Gustafsson & K. Bremer 132), in G. Paczkowska & A.R. Chapman, West. Austral. Fl.: Descr. Cat. p. 260 (2000).

Annual herb 2–20 cm high, glabrous or with scattered simple white hairs. *Leaves* basal in a rosette-like arrangement, first few leaves entire, oblong to oblanceolate, remaining leaves pinnatifid with oblong to linear lobes in the upper two thirds; lamina (including petiole) 8–65 mm long, 2–12 mm wide, lobes 3–8 mm long, 0.2–1.5 mm wide, glabrous or with very infrequent simple white hairs 0.1–0.2 mm long on margins; apex rounded to acute; base with long fine hairs. *Inflorescence* a 1–5-flowered cyme, 17–160 mm long with scattered white hairs throughout in young stages becoming glabrous with age; peduncles 13–140 mm long; pedicels 3–15 mm long; bracts leaf-like, at base of the

pedicel, linear to narrowly oblong, 1.35–6.5 mm long, 0.2–0.8 mm wide, glabrous or with infrequent simple white hairs 0.1–0.2 mm long, apex rounded; bracteoles absent. *Sepals* green, elliptic to broadly ovate, adnate to $\frac{1}{2}$ – $\frac{3}{4}$ of the ovary, 1.35–1.5 mm long, 0.4–0.6 mm wide, glabrous or with scattered simple white hairs 0.1–0.2 mm long outside and on margin, glabrous inside, apex rounded to acute. *Corolla* yellow, 4.7–8.5 mm long, not articulate; tube 1.2–2 mm long, pouch absent; lamina glabrous outside, with fine white hairs from the top of the throat to below the abaxial lobes inside and simple erect hairs 0.05–0.1 mm long on the outer margin of the auricle. *Abaxial corolla lobes* 1.1–2 mm long, 0.7–1.1 mm wide, fused for 2.1–4 mm beyond the junction with the adaxial lobes, distinct from the wings, apex acute; wings 1.0–1.9 mm long, 0.6–0.95 mm wide, rounded, with entire margins. *Adaxial corolla lobes* 2.8–5.3 mm long, 0.35–1.2 mm wide, fused for a further 0.7–1.4 mm; auricle rounded, 1.0–1.3 mm long, 0.3–1.2 mm wide; wings unequal, 0.8–1.8 mm long, 0.2–1.7 mm wide opposite the auricle, 0.7–2.0 mm long, 0.2–0.6 mm wide above the auricle, with entire margins. *Stamen* filaments linear, 0.9–1.2 mm long; anthers elliptic, 0.4–0.6 mm long, mucronulate. *Ovary* 1.6–2.3 mm long, glabrous outside, base rounded and with a clear abscission line below the ovary, septum incomplete and c. $\frac{1}{2}$ length of the locules, glabrous inside, ovules c. 8–10. *Style* 1.8–1.9 mm long, mostly glabrous with scattered fine white hairs to 0.3 mm long towards the apex; indusium 0.7–1.3 mm long, 1.1–1.4 mm wide, the mouth gaping, with scattered simple hairs and conspicuous white bristles 0.1–0.3 mm long on upper and lower lips. *Fruit* ellipsoid, 3.7–4.3 mm long, glabrous. *Seeds* flat, dark purple-black, 2–2.7 mm long, 0.75–1.4 mm wide excluding wing, surface smooth with a distinct ridge; wing cream, 0.2–0.6 mm wide. (Figures 6, 3A, 3B)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld] 23 Nov. 2006, D.A. Mickle DAM 45 (PERTH 07462808); 24 Nov. 2006, D.A. Mickle DAM 46 (PERTH 07462670); 5 Oct. 1976, K.R. Newbey 4839 (PERTH 04208404); 28 Nov. 2003, D. Papenfus 2037 (PERTH 07462697); 20 Sep. 1999, C. Walter 87 (PERTH 05593735).

Distribution and habitat. This species is currently known from two populations approximately 100 km apart, north-east of Albany in the Mallee (MAL) region of the South-West Botanical Province (Figure 1). It is found in low gypseous dunes near salt pans in well-drained, saline, grey or brown loamy clay with scattered *Callitris preissii* subsp. *verrucosa*, *Tecticornia* spp. and *Austrostipa juncifolia*.

Phenology. Flowers from September to October. Fruits forming in December.

Conservation status. DEC Conservation Codes for Western Australian Flora: Priority Two (Atkins 2006), as this species is currently known from only two populations.

Etymology. From the Latin *salinus* (saline), for the saline habitat in which this species grows.

Notes. *Goodenia salina* appears most closely related to *G. pinnatifida* Schldl. Both species have a similar habit and annual life history strategy, unequal corolla wings on the adaxial lobes and lack bracteoles. *Goodenia salina* can be distinguished from *G. pinnatifida* by its prostrate rather than decumbent to ascending habit, shorter corolla length (4.7–8.5 mm rather than 8–19 mm long), shorter pedicel length (3–15 mm rather than 20–120 mm long), shorter sepals (1.35–1.5 mm rather than 2.5–5 mm long) and lower ovule number (c. 8–10 rather than 20–35).

The absence of bracteoles, a yellow corolla and a prominent seed wing place this new species within *Goodenia* sect. *Goodenia* subsect. *Ebracteolatae*.

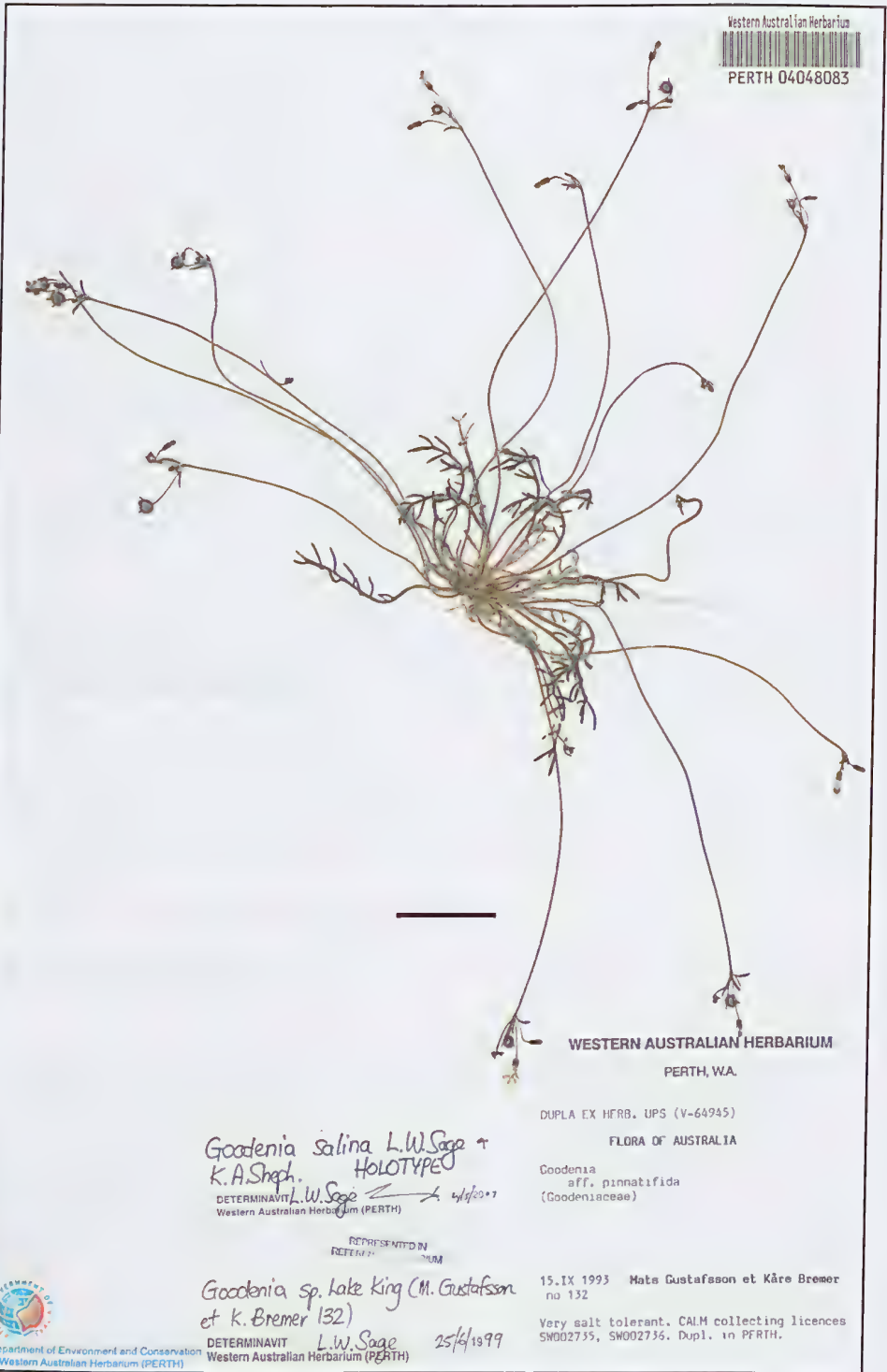


Figure 6. Holotype of *Goodenia salina* (PERTH 04048083), scale = 3cm.

Goodenia turleyae L.W.Sage & K.A.Sheph., *sp. nov.*

Goodeniae claytoniaceae F.Muell. ex Benth. affinis sed indusii pilis strigosis et ovarii base rotundata differt.

Typus: Scadden, Western Australia [precise locality withheld for conservation purposes], 19 November 1999, C.D. Turley 3/1199 (*holo*: PERTH 05501407).

Goodenia sp. Scadden (C.D. Turley 41/VM/1099), in G. Paczkowska & A.R. Chapman, West. Austral. Fl.: Descr. Cat. p. 260 (2000).

Annual herb 3–4 cm high, glabrous or with scattered simple hairs. *Leaves* basal in a rosette-like arrangement, entire, spatulate gradually narrowing basally; lamina (including petiole) 4–32 mm long, 0.9–3.5 mm wide, glabrous or with scattered adpressed and antrorse hairs 0.2–0.3 mm long; apex rounded to acute; base with long fine hairs. *Inflorescence* 1 or 2-flowered, 14–43 mm long, glabrous; peduncles 5–20 mm long; pedicels 4.5–21 mm long; bracts leaf-like, at base of the pedicel, entire, narrowly oblong to spatulate, 2–5.1 mm long, 0.4–1 mm wide, glabrous or with scattered adpressed and antrorse hairs, base with dense white hairs, apex rounded; bracteoles absent. *Sepals* green, narrowly ovate, adnate to $\frac{1}{4}$ – $\frac{1}{2}$ of the ovary, 2.4–3.9 mm long, 0.45–0.9 mm wide, glabrous or with scattered antrorse hairs 0.2–0.3 mm long outside, glabrous inside, apex rounded to acute. *Corolla* yellow, 8–12 mm long, not articulate; tube 1–2 mm long, pouch absent; lamina glabrous or with minute glandular hairs outside, dense white hairs at the top of the throat to below the abaxial lobes inside, simple erect hairs 0.3–0.4 mm long on the outer margin of the auricle. *Abaxial corolla lobes* 2.9–5 mm long, 1.2–1.75 mm wide, fused for 2.5–4.1 mm beyond the junction with the adaxial lobes, distinct from wings, apex acute; wings 2.7–4.4 mm long, 1.7–2.6 mm wide, rounded, with entire margins. *Adaxial corolla lobes* 3.5–5.5 mm long, 0.6–1.1 mm wide, fused for a further 1–1.9 mm; auricle rounded, 1.6–2.2 mm long, 1–1.2 mm wide; wings unequal, 1.0–2.8 mm long, 1–1.5 mm wide opposite auricle, 1.3–3.4 mm long, 0.2–0.6 mm wide above auricle, with entire margins. *Stamen* filaments linear, 1.4–2.1 mm long; anthers elliptic, 0.7–0.9 mm long, mucronulate. *Ovary* 1.4–1.9 mm long, glabrous outside, base rounded, septum incomplete and *c.* $\frac{1}{2}$ length of locules or almost as long as locules, glabrous inside, ovules 18–20. *Style* 2.2–3.4 mm long, mostly glabrous; indusium 0.75–1.25 mm long, 1.25–1.9 mm wide, the mouth gaping, with scattered simple hairs above, dense white hairs to 0.6 mm long below and conspicuous white bristles 0.2 mm long on upper and lower lips. *Fruit and seeds* not seen. (Figure 7)

Selected specimens examined. WESTERN AUSTRALIA: [localities withheld] 29 Sep. 1983, M.A. Burgman & S. McNea 2412 (PERTH 02639327); 4 Oct. 1995, R.J. Cranfield 10442 (PERTH 04409167); 11 Oct. 1999, C.D. Turley 41 VM/1099 (PERTH 05472652, ESP.); 23 Oct. 2005, C.D. Turley 136/1005 (PERTH 07484593).

Distribution and habitat. Currently known from only three populations associated with salt lakes north of Esperance, Western Australia in the Mallee (MAL) region of the South-West Botanical Province (Figure 1). This species occurs in moist sheltered areas in white or grey-brown sand over clay near salt lakes or yellow-brown, gravelly clay and granite in taller mallee or *Melaleuca* shrubland with small shrubs and samphire species.

Phenology. Flowers from September to November.

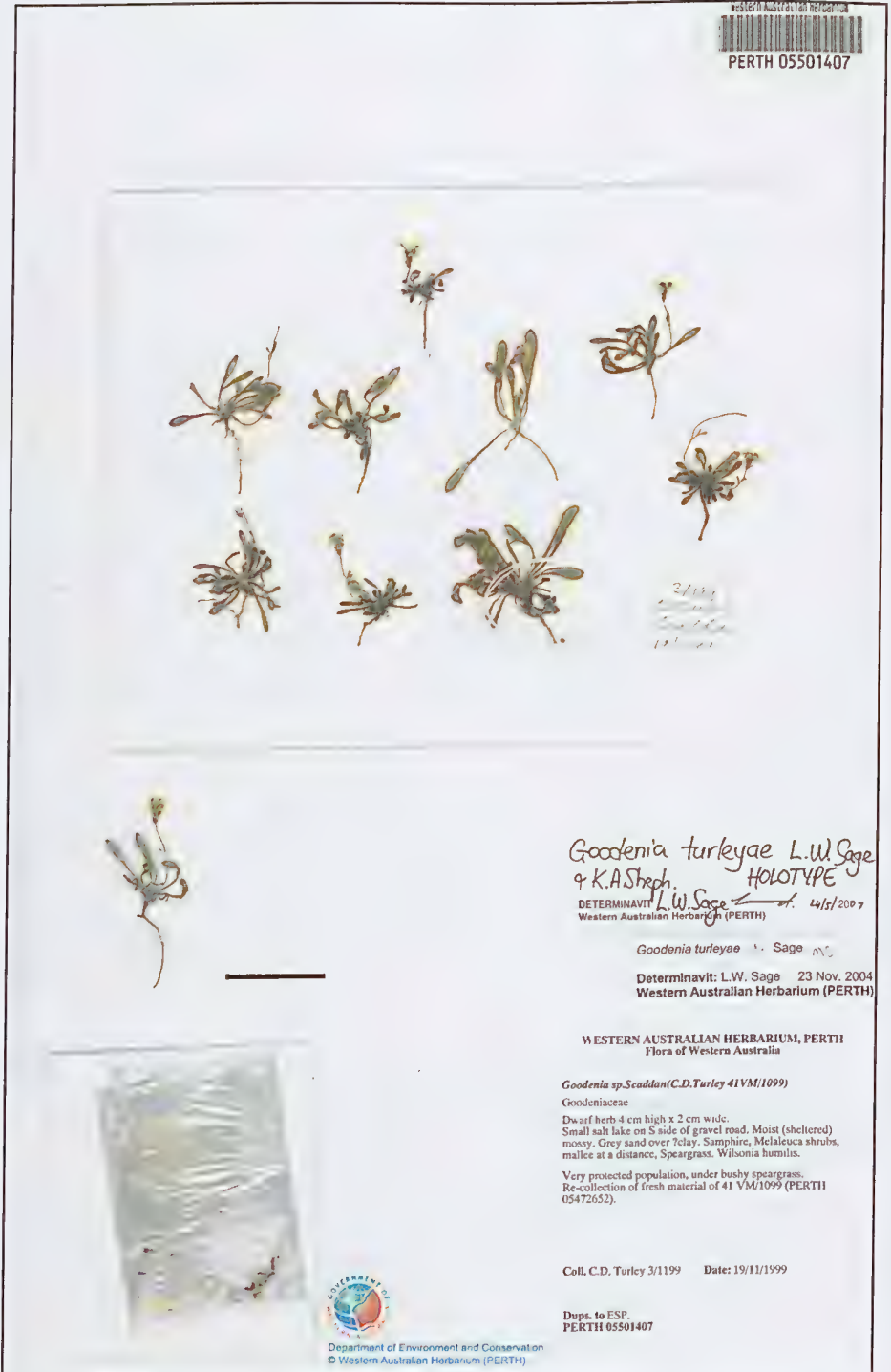


Figure 7. Holotype of *Goodenia turleyae* (PERTH 05501407), scale = 3cm.

Conservation status. DEC Conservation Codes for Western Australian Flora: Priority One (Atkins 2006), as this species is currently known from three restricted populations less than 200 km apart.

Etymology. Named after Coral Turley, amateur botanist of the Esperance region, who first brought this species to the attention of LWS.

Notes. *Goodenia turleyae* appears most closely related to *G. claytoniacea* F.Muell. ex Benth. on the basis of both having bracteoles, a yellow corolla, predominantly basal rather than cauline leaves, a similar form and life history strategy (often clonal) and similar inflorescences. *Goodenia turleyae* can be distinguished from *G. claytoniacea* by having an ovary with a rounded rather than tapered base, a larger corolla (8–12 mm rather than 5–8 mm long) and an indusium that is hairy rather than glabrous.

The presences of mostly basal leaves, bracteoles and a yellow corolla tentatively place this species within *Goodenia* subg. *Goodenia* sect. *Porphyranthus* G. Don.

This species is clonal and forms dense mats of thousands of plantlets close to lake edges (C. Turley pers. comm.).

Amendments to the *Goodenia* key in “Flora of Australia” (Carolin 1992: 149–166)

For *Goodenia corralina*, Group 4 should be amended at Couplet 23 (p. 156) as follows:

23 Leaves without grey T-shaped hairs, glabrous or with some scattered simple hairs

23a Sepals 0.5–2 mm long; mostly erect habit 15. *G. lamprosperma*

23a: Sepals 5–6.5 mm long; low spreading habit *G. corralina*

For *Goodenia granitica*, Group 8 should be amended at Couplet 8 (p. 164) as follows:

8 Stems and leaves with simple hairs not at 90°

8a Sepals ovate-elliptic (2–3 mm long); corolla 8–11 mm long 133. *G. glandulosa*

8a: Sepals narrowly ovate (3–4.2 mm long); corolla 13–16 mm long *G. granitica*

For *Goodenia jaurdiensis*, Group 8 should be amended at Couplet 12 (p. 164) as follows:

12 Ovary tapering at base

12a Ovules 25–35; pedicels ≤ 11 mm long; SE Australian distribution 117. *G. elongata*

12a: Ovules 10–14; pedicels ≥ 12 mm long; SW Australian distribution *G. jaurdiensis*

For *Goodenia salina*, Group 8 should be amended at Couplet 10 (p. 164) as follows:

10 Leaves oblong to oblanceolate, lobed to pinnatifid

10a Corolla 8–19 mm long; sepals lanceolate, 2.5–5 mm long 110. *G. pinnatifida*

10a: Corolla 4.7–8.5 mm long; sepals elliptic to broadly ovate, 1.35–1.5 mm long *G. salina*

For *Goodenia turleyae*, Group 5 should be amended at Couplet 29 (p. 158) as follows:

- 29 Flowers in a few cymes in axils of basal leaves or a simple 1–2 flowered simple raceme
- 29a Inflorescence a few cymes in axils of basal leaves; ovary base tapered; indusium glabrous.....25. *G. claytoniacea*
- 29a: Inflorescence a simple 1–2 flowered raceme; ovary base rounded; indusium hairy.....*G. turleyae*

Acknowledgements

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